

PSC OT-04 OLD PERIMETER ROAD WASTE DISPOSAL SITE

PSC OT-04 consists of the old perimeter road waste application site. From 1951 until approximately 1970, petroleum, oil, and lubricant (POL) wastes generated during Base operations were sprayed on this section of road to control excessive dust. The old perimeter road disposal site begins approximately 200 feet north of Facility 1080 and runs southwest around the southern portion of the runway, then turns northeast before terminating immediately adjacent to Facility 1082. PSC OT-04 is unpaved and approximately 6800 feet long and 15 to 20 feet wide.

According to the IRP Phase I investigation, the total volume of POL waste generated at the Base prior to 1954 was relatively small and was disposed mainly through fire department training exercises. After 1954, the total volume of POL waste generated by the Base increased significantly. Available records show that up to 50,000 gallons per year of POL wastes were disposed on the perimeter road. The majority of the POL wastes disposed at the site consisted of contaminated JP-4, but may also have included aviation gasoline (AVGAS), diesel fuel, waste engine oils, and waste solvents. Other wastes disposed in this manner included wastes from the Facility 912 oil/water separator and tank sludge from the periodic cleaning of fuel storage tanks. Some of the tank sludge contained lead from cleaning AVGAS storage tanks.

During the IRP, Phase II, Stage 1 investigation, eight two-foot deep soil borings were advanced along the road. Samples were collected from each of the borings at one-foot intervals. In December 1991 during the OU-2 RI, twelve 40-foot deep soil borings (SB-1 through SB-12) were drilled along the length of the roadway. The borings were spaced at approximately 800-foot intervals to provide coverage across the entire length of the site. A total of 51 soil samples (48 primary and 3 duplicate) were collected from the borings and submitted for laboratory analysis. The contract laboratory analyzed samples for TRPH (EPA Method 418.1), VOCs (EPA Method 8240), BNAs (EPA Method 8270), and metals (EPA Method 7421). The subsurface sample from each boring was also analyzed for PCBs (EPA Method 8080). Detailed descriptions of the sampling methodologies and analytical results are presented in the OU-2 RI report.

The surface soils in the southern section of the site were found to contain TRPH at concentrations ranging up to 250 mg/Kg. Although soil borings were advanced to 40 feet bgs, samples collected below 10 feet bgs did not show detectable concentrations of TRPH. VOC compounds were not detected in any of the samples, and the only detected BNA compounds were common laboratory contaminants at low concentrations. With only two exceptions, the metals concentrations detected in soil samples were below their respective background upper confidence limits (UCLs).

During 1992 and 1993, the data collected during the OU-2 field investigation were used to evaluate remedial alternatives for the soils at this site. Based on these results of the OU-2 Risk Assessment and Feasibility Study, no further action alternative was proposed. This alternative was officially adopted in the OU-2 ROD that was signed in January 1994.

Later in 1994, concerns arose about the quality of some of the VOC and BNA data used in the original evaluation of PSC OT-04. In response, seven additional samples were collected in August 1996 to replace the original data of unknown quality. The additional samples were collected from three borings, which were located at the areas of the site, which showed the greatest signs of impact.

The three additional soil borings (SB-13 through SB-15) were located adjacent to Soil Borings SB-5, SB-9, and SB-10, respectively. Three surface and four subsurface samples were collected from the borings and submitted to Quanterra laboratories for analysis. VOC and BNA compounds were not detected in any of the additional samples.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future excess lifetime cancer rate (ELCR) and Hazard Index (HI) for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.

PSC DP-05 POL DISPOSAL AREA

PSC DP-05 consists of an 18-acre triangular-shaped area located on the southeast side of Taxiway I. Base Production Well 11 and PSC SD-26 (the Hush House Canal) are located adjacent to the site. PSC DP-05 currently consists of bare ground covered with sparse vegetation. According to the IRP, Phase I investigation results, this area was used for the disposal of petroleum, oil, and lubricant (POL) waste from approximately 1970 until 1972. POL wastes were delivered to the site in 5,000-gallon tanker trucks and dumped in shallow (1.5 feet deep) trenches. The waste was allowed to weather for 4 to 6 weeks and was then covered with soil. Eleven trenches ranging from approximately 200 to 550 feet in length were identified on aerial photographs taken

between 1977 and 1989. A shallow lagoon was also identified at the northeast corner of the site. The lagoon was apparently excavated for additional waste disposal. Undocumented estimates of the POL waste volumes, mostly JP-4, were as high as 100,000 gallons per year at this disposal site from 1970 to 1972.

During the IRP, Phase II, Stage 1 investigation, ten soil borings were drilled and sampled to a depth of 20 feet. A soil gas survey, geophysical survey, and soil boring investigation were conducted during the IRP, Phase II, Stage 2 investigation. The results of the soil gas survey and geophysical survey were used to determine the locations of nine 100-foot soil borings. Monitoring wells MW-104, MW-105, and MW-106 were also installed at the site during the IRP Phase II, Stage 2 investigation. The locations for the monitoring wells were selected to encircle the site as completely as possible.

The OU-2 RI field activities at PSC DP-05 began in December 1991 and continued through June of 1992. Initially, twenty 20-foot deep soil borings (SB-1 through SB-20) were drilled and sampled at the areas of concern identified on aerial photographs. Drilling of two 150-foot deep borings (SB-21 and SB-22) was also initiated in February 1992, however, the borings were not completed due to problems caused by heavy rain. Soil Borings SB-21 and SB-22 were only advanced to depths of 77 feet and 20 feet, respectively. Two 150-foot deep borings were completed as Soil Borings SB-23 and SB-24 in April 1992. After review of the data, borings SB-25, SB-26, SB-27, and SB-28 were drilled as contingency borings in June 1992. The contingency borings were drilled to further characterize the organic compounds detected in samples collected from Soil Boring SB-9. Descriptions of the sampling methodologies and analytical results are presented in the OU-2 RI report.

A total of 100 samples (95 primary and 5 duplicate) were collected from the borings and submitted for laboratory analysis. Samples were analyzed for TRPH (EPA Method 418.1), VOCs (EPA Method 8240), BNAs (EPA Method 8270), and metals (EPA Method 7421). The 0-2 foot bgs sample from each boring was also analyzed for PCBs (EPA Method 8080). With the exceptions of two samples collected from Soil Boring SB-8 and three samples collected from Soil Boring SB-22. The ATI Phoenix laboratory conducted analytical procedures. The ATI San Diego laboratory analyzed the three samples collected from Soil Boring SB-22 and both samples collected from Soil Boring SB-8.

Samples from the majority of the soil borings drilled at the site did not contain detectable concentrations of organic compounds or detections were limited to near surface soils. TRPH, BNA, and VOC compounds were detected at their highest

concentrations in soil samples collected from the center site where the former disposal pits are located. Soil Boring SB-9 and four contingency borings (SB-25 through SB-28) were drilled in this area of the site during the OU-2 RI.

Soil samples collected from Soil Boring SB-9 at a depth of 6 feet bgs contained the highest concentrations of TRPH (8,300 mg/Kg). TRPH was not detected below the depth of 22-feet in any of the samples collected at the site. Ethyl benzene and xylenes were the only detected VOC compounds. The highest detected concentration of ethyl benzene was 0.9 mg/Kg in the 12-14 foot bgs samples collected from Soil Borings SB-25 and SB-27. The highest detected concentration of xylenes was 86 mg/kg in the 6-foot bgs sample collected from Soil Boring SB-9. VOC compounds were not detected below the depth of 14 feet. Three BNA compounds were detected in the central portion of the site near SB-9. The highest detected concentrations were naphthalene at 4.6 mg/Kg, 2-methylnaphthalene at 4.7 mg/Kg, and BEP at 3.7 mg/Kg. BNA compounds were not detected below the depth of 22 feet.

With the exception of lead, all metals results for soil samples collected from PSC DP-05 were either below their respective background UCLs or were within naturally occurring background ranges. The maximum detected concentration of lead (115 mg/Kg) does exceed its background UCL and the upper range of concentrations included in the background data set. Only three samples contained elevated lead concentrations. The surface sample collected from Soil Boring SB-7 contained 115 mg/kg of lead. The two shallowest samples collected from Soil Boring SB-9 contained lead concentrations of 72 mg/kg and 39 mg/kg, respectively. These samples also contained some of the highest concentration of TRPH detected at this site.

Groundwater samples collected from PSC DP-05 did not contain detectable concentrations of organic compounds with just two exceptions. VOC compounds were detected in one sample collected from Monitoring Well MW-104 in November 1992. The only VOC compounds detected were acetone and toluene. These compounds were never detected in any of the other samples collected from Monitoring Well MW-104. BEP, a common laboratory contaminant, was the only other organic chemical detected in groundwater samples collected from this site. This BNA compound was not detected in any of the other groundwater samples. Total silver (0.018 mg/L) was detected in one groundwater sample collected from Monitoring Well MW-106. Silver was not detected in any of subsequent groundwater samples events or in any of the other samples collected at the site. All other metals detected in groundwater samples collected from PSC DP-05 were either below their respective background UCLs or were within the range of naturally occurring concentrations included in the background data set.

During 1992 and 1993, the data collected during the OU-2 field investigation were used to evaluate remedial alternatives for the soils at this site. Based on these results of the OU-2 Risk Assessment and Feasibility Study, a no further action alternative was proposed. This alternative was officially adopted in the OU-2 ROD that was signed in January 1994.

Later in 1994, concerns arose about the quality of some of the VOC and BNA data used in the original evaluation of PSC DP-05. Because only a limited area near the center of the site was impacted, the FFA parties determined that two additional soil borings (SB-29 and SB-30) would provide the needed data. Both borings were located in near the center of the former disposal pits at the area of the site that showed the greatest sign of impact. Soil Boring SB-29 was located adjacent to Soil Boring SB-27. Soil Boring SB-30 was located adjacent to Soil Boring SB-25. None of the samples collected from the additional soil borings contained detectable concentrations of VOCs or BNAs.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future ELCRs and HIs for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.

PSC FT-06 SOUTH FIRE TRAINING AREA**PSC FT-06 SOUTH FIRE TRAINING AREA****PSC FT-06 SOUTH FIRE TRAINING AREA****PSC FT-06 SOUTH FIRE TRAINING AREA**

PSC FT-06 was the original fire department training area for the Base. PSC FT-06 is located in the southern portion of the Base, east of the Facility 1009 power check pad. The PSC is a rectangular area approximately 8 acres in size. Buildings 1031, 988, and 1018 are located on the site. Eighty percent of the PSC is paved; this includes portions that are under building foundations, parking lot asphalt, and a concrete lined storm drain canal. Twenty percent of the PSC is unpaved including landscaped areas around buildings, parking lots that are covered with gravel, and a bare area north of the perimeter road.

During past operations, standard practice was to transport petroleum, oil, and lubricant waste in 55-gallon drums to the fire department training site. The POL wastes were poured onto an old aircraft or simulated aircraft in a cleared, unlined, bermed circular

pit approximately 100-feet in diameter. The structures were then set on fire and extinguished with water and aqueous film forming foam (AFFF). Fire training operations were conducted at this site from 1941 until deactivation of the Base in 1946, and again from the time of Base reactivation in 1951 until approximately 1973. Aerial photographs from 1953, 1962, and 1970 indicate that 13 pits of various dimensions were present at this site.

Ten 20-foot deep soil borings were originally proposed in the IRP, Phase II, and Stage 1 investigation. However, due to construction at the site, drilling of the proposed soil borings was prohibited. Instead, four shallow soil samples (2 to 3-feet total depth) were collected from soil exposed by construction activities. In addition, two 100-foot borings were drilled, and a total of 40 subsurface soil samples were collected during the IRP Phase II, Stage 2 soils investigation.

Two groundwater monitoring wells (MW-107 and MW-108) were installed at this site during the IRP, Phase II, and Stage 2 groundwater investigation. Monitoring well locations were chosen so that MW-107 was located between the former pits and MW-108 was in the presumed down gradient direction. Monitoring Wells MW-107 and MW-108 were included in the Base wide groundwater monitoring and sampling program, which continued through the second quarter of 1996.

From December 1991 through April 1992, 18 soil borings (SB-1 through SB-18) were drilled and sampled at the site during the OU-2 field investigation. Thirteen borings were advanced to 100 feet bgs and five borings were advanced to 20 feet bgs. The locations were selected so that at least one 100-foot deep soil boring would be advanced in each of the former fire training pits identified on the aerial photographs.

TRPH was detected in 14 of the 18 soil borings, with the highest concentration of 18,000 mg/Kg being in the 2-4 foot bgs sample from Soil Boring SB-5. The TRPH values from the remaining borings ranged from 10 to 12,000 mg/Kg. With the exception of Soil Borings SB-5 and SB-18, TRPH was not detected below 20-feet. In Soil Borings SB-5, and SB-18, TRPH was detected at maximum depths of 38 and 24 feet bgs, respectively. VOC compounds including BTEX, TCE, PCE, MEK and methyl isobutyl ketone were detected at depths up to 14 feet bgs. BNA compounds, such as phenanthrene, chrysene, fluoranthene, pyrene, benzo(b)fluoroanthene, and benzo(a)pyrene, were detected in samples from 16 borings. Sample collected from Soil Boring SB-8 contained the highest concentrations of BNAs, with 27 BNA compounds detected in the 0-2 foot bgs sample. BNA compounds were detected at depths up to 24 feet bgs. PCBs were not detected in any of the samples collected and analyzed at PSC FT-06.

Three surface soil samples were also collected from PSC FT-06 for dioxin and furan analysis. Two composite soil samples and one background sample were collected and submitted for analysis. Dioxins and furans were not detected in either of the composite samples. However, the background sample did contain heptachlorodibenzo-p-dioxin (HpCDD) at a concentration of 1.2 nanograms per gram (ng/g), octachlorodibenzo-p-dioxin (OCDD) at 4.6 ng/g, heptachlorodibenzo-p-furan (HpCDF) at 1.1 ng/g, and octachlorodibenzo-p-furan (OCDF) at 2.0 ng/g. Because this sample was not collected in the former fire training pits, the presence of the dioxins and furans is most likely not related to site activities.

The results of the analyses conducted on groundwater samples collected from Monitoring Wells MW-107 and MW-108 indicate VOCs, BNA compounds, and EDB, are not present in the groundwater at this PSC. The agricultural pesticide DBCP (0.05 micrograms per liter) was present in groundwater. DAsc9D0.0d.17.2623 0 Tundsconces prelectederwtedpreer, the bacs agact

concentration was 0.33 mg/Kg of pyrene. Seven VOC compounds were detected in the subsurface sample collected from Soil Boring SB-24. The highest detected concentration was 23 mg/Kg of xylenes. BNA compounds 2-methylnaphthalene (15 mg/Kg) and naphthalene (33 mg/Kg) were also detected in this sample.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future ELCRs and HI's for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.

PSC FT-07W WESTERN PORTION OF THE NORTH FIRE TRAINING AREA

PSC FT-07W is located in the northern portion of the Base, west of Fire Department Training Facility 1355. PSC FT-07W was previously identified as Site Number 7 in the IRP Phase I, Records Search Report (CH2M HILL, 1982). The North Fire Training Area (NFTA) was divided into an eastern and western portion during the RI. The soils in the western portions were included in the OU-2 investigation. The eastern portion of the site was investigated during the OU-1 RI. Section 13 of this report details the investigative results of the eastern portion of the site.

The western portion of the NFTA occupies approximately 14 acres west of Facility 1356. Approximately 50 percent of the site is currently occupied by a new fire training facility that was constructed in the spring of 1996. The remaining portion of the site is covered by bare ground with sparse vegetation. During past operations at the site, POL waste was poured into circular unlined bermed areas containing mock aircraft and then set on fire for fire fighting training. These fires were extinguished with water and aqueous film forming foam.

During the IRP Phase II, Stage I investigation, Weston identified three former fire-training pits in the western portion of PSC FT-07. Four 20-foot deep soil borings were drilled at these pits. Two 20-foot deep borings were advanced within the biggest pit, while a single 20-foot deep boring was advanced in each of the smaller pits. VOC and Oil & Grease were detected in several samples collected from the pits. Based on the results of this contaminant verification sampling, additional investigation was

recommended at two of the pits in the IRP Phase II, Stage 2 investigation. During the IRP Phase II, Stage 2 investigation, Weston advanced a 100-foot soil boring in the two pits recommended for further investigation. Three monitoring wells (MW-109, MW-110, and MW-111) were also installed and sampled by Weston during the IRP Phase II, Stage 2 investigation.

Following completion of Weston's activities, EA Engineering Science and Technology, was contracted to perform additional soil investigations across the entire site at PSC FT-07W. The main objective of the EA Engineering's investigation was to design a soil vapor extraction system for the eastern portion of the site (FTP-3 and FTP-4). However, they did advance four additional borings in each of the three pits identified in the western portion of the site. EA Engineering designated the three pits in the western portion of the site as FTP-1, FTP-2, and FTP-5.

For each of the pits, a deep boring was drilled in the center of the pit and three shallow borings were drilled around its perimeter. The deep borings in FTP-1 and FTP-5 were advanced to a depth of 100 feet bgs. The deep boring for FTP-2 was only advanced to a depth of 50-feet bgs. The shallow borings were all drilled to a depth of 30 feet bgs. Samples collected from these borings were analyzed for TRPH (EPA Method 418.1), VOCs (EPA Method 8240), and metals (EPA Method 7421) by Southwest laboratories of Oklahoma.

Soil sampling data indicated that only low concentrations of acetone and methylene chloride were present in the samples. Although numerous detections of these constituents were attributed to laboratory contamination, the deepest samples collected from FTP-1 and FTP-5 that were analyzed for VOCS did contain detectable concentrations of acetone and methylene chloride that were not flagged as laboratory contaminants. EA Engineering did not detect pOL-related constituents, such as BTEX and TRPH, in any of the samples collected from the western portion of the site.

During the compilation of the planning documents for the OU-2 investigation, Geraghty & Miller identified seven additional fire-training locations in the western portion of the site. These pits were identified on 1965, 1970, and 1973 aerial photographs. A total of 10 former fire-raining pits (FTP-1, FTP-2, FTP-5, and seven un-numbered pits) were included in the OU-2 investigation. During the OU-2 RI, Geraghty & Miller advanced 20 soil borings in the western portion of PSC FT-07. Ten of the borings were drilled to a depth of 100 feet, and ten drilled to a depth of 20-feet. A deep boring was advanced in each of the ten pits. The ten shallow borings were advanced at various locations around the pits to define the horizontal extent of any detected constituents.

Soil samples collected from six of the former fire training pits contained detectable concentrations of organic chemicals. The six pits with organic chemical detections include FTP-1, FTP-2, and FTP-5 and three smaller un-numbered pits. Detected organic constituents are limited to TRPH and BNA compounds. Soils containing detectable concentrations of TRPH range to depths of 100 feet bgs at FTP-2 and 60 feet bgs at FTP-5, but to depths of less than 16 feet bgs in all other areas. BNA compounds were only detected in three samples and were not detected below the depth of 6 feet bgs. Lead was the only inorganic constituent detected above background ranges. Only two samples contained elevated lead concentrations. Both borings with samples containing elevated lead levels also contained detectable concentrations of TRPH.

Based on a review of EA Engineering's data and the data produced during the OU-2 RI, the vertical extent of organic constituents were not defined to within laboratory detection limits at three areas of the site. Samples collected at FTP-2 during the OU-2 RI contained detectable concentrations of TRPH at depths of 100 feet bgs. Samples collected at the center of FTP-1 by EA Engineering contained methylene chloride at a depth of 120 feet bgs. Although methylene chloride is a common laboratory contaminant, this detection at this depth was not qualified. Similarly, samples collected from the center of the FTP-5 at a depth of the 120 feet bgs contained detections of methylene chloride and acetone that were not qualified.

Following completion of the OU-2 investigation, three additional soil borings were advanced and sampled at the site. The purpose of the additional sampling was to define, to laboratory non-detectable levels, the maximum vertical extent of the constituents of potential concern in the soil. TPH was not detected below a depth of 10 feet in any of these three borings. VOCs were not detected in samples collected from Soil Borings SB-24 or SB-25. The only VOC detected in samples collected from Soil Boring SB-27 was acetone; however, based on data validation criteria, all acetone detections were qualified as a laboratory contaminant. Based on the results of the additional sampling investigation, the vertical extent of organic chemicals in the soils beneath each of the former fire training pits at PSC FT-07 have been defined to be less than 120 feet bgs.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future ELCR's and HI's for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based

remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.

PSC ST-18 FACILITY 993

PSC ST-18 consists of a former liquid waste storage facility (Facility 993) located in the southern part of the Base. Facility 993 originally consisted of a single 5,000-gallon refueling tank truck that was coated and buried in 1968. This underground storage tank (UST) was used for the temporary storage of all liquid petroleum, oil, lubricant (POL) and solvent wastes generated at the Base. Prior to 1972, liquid wastes stored at this facility were disposed during road oiling and dust suppression activities (PSC OT-04), in narrow trenches (PSC DP-05), and in fire training activities (PSCs FT-06 and FT-07). In 1972, two 10,000-gallon capacity USTs were installed at the facility, and the area around all three USTs, approximately 0.2 acres, was enclosed with a fence. Also at this time, the Base began selling the liquid wastes to private contractors for recycling.

This facility was classified as an interim status treatment, storage, and disposal (TSD) facility under RCRA in 1979. Part A of a Hazardous Waste Permit application was submitted in 1980. However, closure of this facility began in 1982 to facilitate the construction of a new USAF Reserve maintenance building.

The USAF to direct the closure activities and related subsurface investigations retained Raymond E. Kary, Ph.D., in association with Guitierrez-Palmenberg, Inc. (GPI). Initially, twelve 50-foot deep soil borings were drilled adjacent to the USTs during July and August 1983. The analytical results showed no contaminants. Based on the results of the initial investigation, a partial closure plan was submitted to the Arizona Department of Health Services. The closure plan was approved on October 4, 1983.

The three USTs were removed on October 19, 1983 following this initial investigation. Soil samples collected directly beneath the 5,000-gallon tanker truck and one of the 10,000-gallon USTs showed signs of impact from past releases. The tank pit was excavated to a depth of 16 feet bgs in an attempt to assess the extent of contamination. Based on field observations, highly impacted soils were manifested to a hazardous waste landfill. The moderately contaminated soils were aired for several weeks and replaced in the pit, and the minimally contaminated soils were placed directly back into the pit.

Because this site was an active facility in 1981, it was not identified in the IRP Phase I investigation which was focused on historic waste disposal activities. However, the Base decided to include this site in the IRP Phase II investigation because of the sampling results of the UST closure activities. Between November 4, 1985 and February 6, 1986, Weston continued the investigation of the site during the IRP, Phase II, and Stage 1 investigation. During this investigation, five soil borings were advanced in and around Facility 993. Soil Boring depths ranged from 100-145 feet bgs. In addition, five groundwater monitoring wells (MW-1 through MW-5) were installed. Conclusions presented in the IRP, Phase II, Stage 1 report (Roy F. Weston, 1986) indicated that the soil beneath the former USTs had been impacted by fuel and organic solvents, and the impacted soil extended to the maximum depth of 56.5 feet bgs.

The site was capped with concrete in 1987 as part of the RCRA post-closure requirements for the site. In a letter dated May 13, 1988, the ADEQ stated that they had inspected the concrete cap covering the facility and it was satisfactory. Currently, the Base continues to inspect and maintain the cap to ensure integrity of the concrete and sealed joints.

In September 1990, the Federal Facilities Agreement for Luke AFB was signed and regulatory authority for Facility 993 was transferred from the RCRA program to the CERCLA program as part of RCRA/CERCLA integration. The FFA parties elected to include Facility 993 in the OU-2 remedial investigation as PSC ST-18.

From February to June of 1992, eight soil borings were drilled during the OU-2 investigation to define the horizontal and vertical extent of the soil impact. A total of 37 samples were collected from the borings and submitted to the ATI Phoenix laboratory for analysis. The highest detected concentrations of TRPH were in the samples collected from Soil Borings SB-1 and SB-2, which were drilled at the former leaking UST locations. The highest detected TRPH value in Soil Boring SB-1 was 4,900 mg/Kg in the 12-14 feet bgs sample. Samples collected from Soil Boring SB-2 contained TRPH at concentrations of 10,000 mg/Kg and 17,000 mg/Kg in the 12-14 foot bgs and 20-22 foot bgs samples, respectively. VOC compounds were only detected in Soil Borings SB-1 and SB-2. Detected compounds include: BTEX, 1,1-dichloroethane, 1,1,2,2-tetrachloroethane, TCE, and PCE. The highest concentrations of VOCs were detected in the 20-22 foot bgs sample from Soil Boring SB-2, which was also the sample with the highest TRPH value. BNAs were detected in samples from all eight borings. In general, the detected BNA compounds were all found in samples that also contained TRPH.

Groundwater quality beneath PSC ST-18 was evaluated using analytical results from groundwater samples collected at Groundwater Monitoring Wells MW-2, MW-3, MW-4, MW-5, MW-114, and MW-122. VOCs and BNAs were not detected in Monitoring Wells MW-2, MW-3, MW-5, or MW-122. EDB and DBCP were not reported in any samples collected from Monitoring Wells MW-2, MW-4, MW-5 and MW-114. EDB was also not detected in the samples analyzed from Monitoring Well MW-3.

Toluene was detected at a concentration of 4 µg/L during the first quarter 1992 groundwater sampling event at Monitoring Well MW-4. Toluene has not been reported in subsequent sampling events at Monitoring Well MW-4 or in any of the other wells monitored at ST-18. BEP, a common laboratory contaminant, was detected during the first quarter 1992 and second quarter 1993 in Monitoring Well MW-114. However, BEP was reported in the equipment blank during the first quarter of 1992.

DBCP was reported in Monitoring Well MW-3 at a concentration of 0.07 µg/L in the only sampling event (fourth quarter 1992) for which analyses for DBCP were performed. DBCP is a pesticide that was commonly used in citrus groves from the mid-1950s until it was banned by the USEPA in 1980. Citrus groves may have been located on private lands adjacent to Luke AFB. No citrus groves are currently present at Luke AFB. Although DBCP was not detected in any other wells at ST-18, it was reported in Monitoring Wells MW-107, MW-108 and MW-110.

Throughout 1992 and 1993, the data collected during the OU-2 field investigation were evaluated to determine the appropriate remedial alternative for this site. Based on the results of the OU-2 Risk Assessment and OU-2 Feasibility Study, the remedial action proposed for implementation at PSC ST-18 was capping, surface controls, and monitoring. The FFA parties in the OU-2 ROD that was signed in January 1994 officially adopted this alternative. Although a cap had already been installed at the site, the monitoring requirements for PSC ST-18 were not identified in the OU-2 ROD because they are dependant on the results and conclusions of the groundwater investigation which is included as part of the OU-1 Remedial Investigation Report.

Later in 1994, concerns arose about the quality of some of the VOC and BNA data used in the original evaluation of PSC FT-06. Because CERCLA guidance requires that only data of known quality be used to evaluate remedial alternatives for a site, the FFA parties elected to collect additional data at the site to re-evaluate the original remedial alternatives. Additional data was also to be collected to refine the delineation of the extent of the soil impact. A more refined delineation of the extent of impact was

needed to assist in the establishment of long term groundwater monitoring requirements for the site, as required by the original OU-2 ROD.

Nine additional soil borings were advanced and sampled in August of 1996 because of concerns of the quality of the original VOC and BNA data and to refine the delineation of the horizontal and vertical extent of the impacted soil. A total of 36 samples (33 primary and 3 duplicate) were collected from the nine borings and submitted for laboratory analysis.

Analytical results from the additional sampling indicated that TPH concentrations are highest in the area of the former UST pit. TPH concentrations were detected to depths of 48-50 feet bgs in SB-11 and 78-80 feet bgs in SB-10. In both borings, the samples containing the highest detected TPH concentrations (6,800 for SB-10 and 18,000 mg/Kg for SB-11) were collected at a depth of 18-20 foot bgs. This depth corresponds to just below the depth excavated during the removal of the USTs. VOC compounds (including BTEX, TCE and PCE) were detected in Soil Borings SB-10 and SB-11 to depths of 60 feet bgs. BNAs were detected in Soil Borings SB-10 and SB-11, but only in those samples, which also contained TPH. BEP, a common laboratory contaminant, was also detected in Soil Borings SB-9, SB-13, SB-14, and SB-15. Most values were qualified as estimated values.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future ELCRs and HIs for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (capping, surface controls, and monitoring) was re-affirmed as protective of human health and the environment.

PSC DP-22 POL TRENCH AT NORTHEAST RUNWAY

PSC DP-22 is an irregular-shaped area located at the north end of the inboard runway. The site occupies approximately 4.6 acres. Approximately 30 percent of the PSC is covered with concrete (the inboard runway), 20 percent is covered with bituminous cover, and 50 percent of the site is covered by gravel with sparse vegetation.

This site may have been used for the disarmament and de-fueling of aircraft during the 1940s and 1950s. Reportedly, waste POL was dumped into shallow trenches at this site. Based on interviews with Base personnel, off-loaded fuel may have been drained into trenches perhaps 600 to 800 feet long and a few feet deep. No evidence of trenches was visible on examination of aerial photographs. During the 1950s, the configuration of the east runway was different than it is at present. The reported disposal site was located approximately 800 feet southwest of where the runway presently ends. Construction of the runway extension in the late 1950s ended disposal of POL in this area. There were no environmental investigations conducted at this site prior to the OU-2 RI.

In January and February of 1992, five soil borings (SB-1 through SB-5) were drilled at PSC DP-22 during the OU-2 investigation. TRPH concentrations were detected in the surface or near surface samples collected at each of the borings. Detected TRPH concentrations generally decreased with increasing depth. The surface sample collected from Soil Boring SB-4 contained the highest detectable concentration of TRPH (970 mg/Kg). Although TRPH was generally not detected in subsurface soils, TRPH was detected at concentrations near the laboratory detection limits in the 98-100 foot bgs samples from Soil Borings SB-3 and SB-4. The only VOC detected was acetone at a concentration of 1.0 mg/Kg in the 10-12 foot bgs sample collected from Soil Boring SB-2. BNA compounds were not detected in any of the 21 soil samples submitted for laboratory analysis. The highest detected concentrations of barium (407 mg/Kg) and lead (30 mg/Kg) do exceed their respective background UCLs. The surface sample collected from Soil Boring SB-3 contained both of these elevated metals concentrations. This sample also contained TRPH. None of the other samples collected from the site contained metals at concentrations above their background UCLs.

During 1992 and 1993, the data collected during the OU-2 field investigation were used to evaluate remedial alternatives for the soils at this site. Based on these results of the OU-2 Risk Assessment and Feasibility Study, a no further action alternative was proposed. This alternative was officially adopted in the OU-2 ROD that was signed in January 1994.

Later in 1994, concerns arose about the quality of some of the VOC and BNA data used in the original evaluation of PSC DP-22. The FFA parties determined these data were of unknown quality. In response, six additional samples (5 primary and one duplicate) were collected in August 1996 to replace the original data of unknown quality. The additional samples were collected from three borings, which were located at the areas of the site, which showed the greatest signs of impact.

The three additional soil borings (SB-6 through SB-8) were located adjacent to Soil Borings SB-3, SB-1, and SB-4, respectively. Three surface and three subsurface samples (5 primary and one duplicate) were collected from the borings and submitted to Quanterra laboratories for analysis. None of the samples collected from the additional soil borings contained detectable concentrations of VOCs. The primary subsurface sample collected from Soil Boring SB-7 contained a concentration of 0.17 mg/Kg of BEP, a common laboratory contaminant. This was the only BNA compound detected in any of the six additional soil samples.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical ELCRs and HIs for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.

PSC DP-23 OLD SURFACE IMPOUNDMENT AREA

PSC DP-23 consists of the Old Surface Impoundment and associated wash located west of Building 999 and adjacent to the former south fire training area. The old surface impoundment portion of the site is a rectangular-shaped area that occupies approximately 3.3 acres. Currently, 80 percent of this area is either paved with asphalt, under tarmac, or under concrete, which includes the AGE equipment yard. In the late 1940's, an impoundment dam was constructed along an old natural drainage system, which flowed south off of the Base. This area may have been used for the disposal site for POL waste until construction covered the site in 1969. The dam used to create the surface impoundment was buried, but not removed. The wash portion of the site is located to the south of the impoundment area and occupies approximately 19.4 acres. The wash extends off Base and flows south to an area of earth fissures (See PSC SD-20).

In February of 1992, two 150-foot deep borings (SB-2 and SB-4) and four 40-foot deep soil borings (SB-1, SB-3, SB-5, and SB-6) were drilled and sampled at PSC DP-23 during the OU-2 investigation. Sediment samples were collected from ten locations (SD-1 through SD-10) in December of 1991 and February of 1992. A total of 26 soil samples (23 primary and 3 duplicate) and 21 sediment samples (20 primary and 1 duplicate) were collected and submitted for laboratory analysis.

The highest detected concentration of TRPH was 2,000 mg/kg in the 2 to 4 foot bgs sample collected from Soil Boring SB-4. The only detected VOC compounds (trace concentrations of toluene and ethyl benzene) were also detected in this sample. TRPH was generally confined to shallow soils, and the deepest sample with detectable TRPH concentrations was collected at a depth of 8 to 10 feet bgs from SB-5.

Six soil and five sediment samples collected during the OU-2 investigation contained detectable concentrations of BNA compounds. Four samples contained concentrations of Benzo(a)pyrene in excess of its Preliminary Remediation Goal (PRG) of 0.78 mg/kg. These four samples include the surface sample and its duplicate collected from SB-4, the 2 to 4 foot bgs sample collected from SB-4, and the surface sample collected from SB-5. None of the other samples contained BNA compounds at concentrations in excess of their PRGs

The data collected during the OU-2 field investigation were evaluated to determine the appropriate remedial alternative for this site. Based on the results of the OU-2 Risk Assessment and OU-2 Feasibility Study, the remedial action proposed for PSC DP-23 was excavation of all soils with benzo(a)pyrene concentrations above the PRGs, biological treatment to reduce contaminant concentrations, monitoring to confirm effectiveness, and return of the treated soils to the excavation for final disposal. The FFA parties in the OU-2 ROD that was signed in January 1994 officially adopted this alternative.

PSC SD-40 TAXIWAY FUEL DISCHARGE AREA

PSC SD-40 consists of the areas located on both sides of the southeastern end of Taxiway F and on both sides of the south-central section of Taxiway E. The southern area of the PSC (along Taxiway F) covers approximately 3 acres and the northern area (along Taxiway E) covers approximately 7.6 acres. The areas adjacent to the taxiways are covered with a bituminous dust cover of 2-inch thick asphalt. The site has been used to perform limited service of aircraft since the present runway layout was complete in the 1950s. De-fueling of jet aircraft onto the bituminous cover was reportedly conducted for fuel tank maintenance. This de-fueling practice occurred on Taxiway F from the early 1970s until 1990.

Information from interviews with Base personnel indicates that during maintenance activities fuel was drained from the aircraft fuel tanks onto the dust cover adjacent to the taxiways. De-fueling of jets is believed to have been the primary source of releases from the 1970s until the de-fueling procedure was modified in 1990 to control those releases. The amounts of fuel involved in the individual events varied depending on

the maintenance involved. In addition, hydrazine may have been discharged onto the surface adjacent to the Foxtrot Extension during F-16 maintenance. Staining of the taxiways and asphalt along the taxiways is documented by historical aerial photographs dating back to 1964. No staining was visible in the 1958 aerial photographs so the maintenance activities may have begun between 1958 and 1964. Information from interviews indicates that for at least 20 years these areas were used as Alternate F-15 fuel tank maintenance areas.

In April of 1992, eleven 100-foot deep borings were drilled at PSC SD-40 during the OU-2 investigation. TRPH was detected in 21 of the 47 samples and in samples collected from ten of the eleven borings. The highest detected concentration of TRPH was 1,200 mg/Kg in the 0-2 feet bgs sample from Soil Boring SB-7. TRPH concentrations were generally confined to 4 feet bgs, with concentrations decreasing with increasing depth. Only three samples collected below the depth of 4 feet contained detectable concentrations of TRPH. The two deepest detections of TRPH were in soil borings SB-3 and SB-7. The 98 to 100 foot bgs sample collected from both of these borings contained 20 mg/kg of TRPH. VOCs were only detected in two samples, SB-2 at 98-100 feet bgs and the surface at SB-7. These results in Soil Boring SB-2 at 98-100 feet bgs are most likely related to either laboratory or field sampling contamination. VOCs (toluene, ethyl benzene, and xylenes) were detected in the 0-2 feet bgs sample collected from Soil Boring SB-7. The BNA compounds naphthalene and 2-methylnaphthalene were also detected in this sample. This was the only sample with detectable BNA compounds. PCBs were not detected in any of the samples.

The highest detected concentrations of barium (402 mg/Kg), copper (42.8 mg/Kg), and nickel (35 mg/Kg) slightly exceed their background UCLs. The only sample that contained these metals at levels above the average for the site was collected from SB-8 at a depth of 98 to 100 feet bgs. This sample also contained the highest detected concentration of zinc. No trends were observed with respect to metals results and depth of sample collection.

Throughout 1992 and 1993, the data collected during the OU-2 field investigation were evaluated to determine the appropriate remedial alternative for the soils at this site. Based on the results of the OU-2 Risk Assessment and OU-2 Feasibility Study, a no further action alternative was proposed. The FFA parties in the OU-2 ROD that was signed in January 1994 officially adopted this alternative.

Later in 1994, concerns arose about the quality of some of the VOC and BNA data used in the original evaluation of PSC SD-40. In response, three additional soil borings were advanced at the site in August of 1996. .

A total of seven soil samples (three surface and four subsurface) were collected in August of 1996 during the additional sampling investigation. None of the samples collected from the additional soil borings contained detectable concentrations of VOCs. The 14-16 foot bgs sample collected from Soil Boring SB-12 contained a concentration of 0.075 mg/Kg of bis(2-ethylhexyl)phthalate, a common laboratory contaminant.

These new sampling data were used with previously collected data of known quality to re-calculate the risk assessment for the site. The results of the risk assessment showed that exposure to the soil at this site would not cause a risk to human health of the environment. Both current and hypothetical future ELCRs and HIs for exposure to soils at these sites were below the ADEQ and USEPA's residential risk-based remediation benchmarks (ELCR less than 10^{-4} , HI below 1.0). As a result, the original remedial alternative selected for the site (no further action) was re-affirmed.